

Development of the Earth Science Data Systems Standards Process

Process Results

The proposed process will result in the following beneficial characteristics:

- Credibility - "peer" and "stakeholder" review of proposed standards will establish trust that standards are sound.
- Transparency - within the ESDS and allied communities, the progress of standards decisions will be evident
- Workability - implementation examples and evidence of operational success will encourage adoption of standards that are known to work
- Timeliness - standards adoption will keep up with technological innovation and fit into the schedule needs of missions.
- Relevance - standards will be responsive to ESDS mission, science and data systems requirements

Impact to Data Systems

The adoption of interoperability standards will benefit the future evolution of ESDS data systems:

- Lower Cost - Adoption of standards results in lower costs for data system maintenance and replacement cycles.
- Lower Risk - Adoption of proven standards assures that ESE data systems continue to be effective.
- Greater Flexibility - Standards establish interoperability among ESE data systems analogous to "plug-and-play".
- Greater Innovation - Standards for data systems mean that ESDS activities can pursue science and application innovation.

ESDS standards assumptions and motivations:

The following assumptions motivate the design of the standards process.

1. Future advances with ESDS data will require cooperative data transfer:
 - Diverse sensors, platforms and projects
 - Multiple formats and projections
 - Need for coherent science record
 - Many and various applications supported
2. ESDS goals require that data have consistent content, encoding and interface:
 - Comparable data content especially for development of long-term measurement time series is a scientific necessity.
 - Limiting the range of encoding (i.e. data formats or record definitions) is a benefit to software development both for science data systems and for applications.
 - Use of common protocols for interchange and delivery benefits routine science operation and distribution to support applications.

SEEDS Community Principles

Some principles and assumptions expressed in the SEEDS pre-formulation document, in interviews with stakeholders and in public workshops:

- ESDS data systems future selection and management will emphasize flexibility and accountability over centralization.
- Diversity in ESDS data systems implementation will be encouraged with coordination at the interfaces.
- Future systems will be more distributed geographically, functionally and managerially.
- Standards are available, the ESDS need not develop unique standards, but rather adopt appropriate standards by drawing on technical expertise from the wider Earth science community.
- There are no one-size-fits-all standards. Different communities of use require different standards.
- The ESDS should only mandate use of standards that have been shown to work in the ESE context.

Process Model Comparisons

The SEEDS study examined several models for standards development and adoption. These included ISO TC211, OGC, W3C, CCSDS, FGDC and IETF. The team recommended building an ESDS process based on Internet Engineering Task Force (IETF) model. IETF benefits:

- Openness
- Potential for speedy decision-making
- Emphasis on working implementations
- Simple, effective, open documentation practices

- Consensus decision making
- History of success of Internet validates model for information interface standards.

Tailoring for ESDS

Data systems for NASA's ESDS have additional requirements. To accommodate ESDS needs, the IETF example is modified to better reflect:

- **Timeliness:** ESDS data systems developers work to a schedule. Standards decisions must support mission schedules.
- **Resource Impacts:** Adoption of standards may involve costs that are outside a mission's profile. Standards cannot be imposed if there are insufficient resources.
- **Accountability:** A consultative process cannot bind the agency to use of particular standard. Policy decisions must be made by NASA management.